

COURSE CODE (CREDITS): 21MS1MB312 (3)

MAX. MARKS: 25

COURSE NAME: DIAGNOSTIC MICROBIOLOGY AND VACCINES

COURSE INSTRUCTORS: Dr. Rahul Shrivastava

MAX. TIME: 1 Hour 30 Minutes

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*Note: (a) All questions compulsory. (b) Marks are indicated against each question in square brackets. (c) Calculators are NOT allowed, all steps of the numerical to be done in the answer sheet only.*

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Q1. A 1.8 Kb Thalassaemia diagnosis related gene needs to be amplified. If there are two template DNA molecules present in the initial PCR reaction mixture, calculate the number of molecules that would be obtained after 5 cycles of PCR if the extension time used is: [1+1+2 = 4]

- a. 1 min
- b. 2 mins
- c. 4 mins

Q2. Forward and Reverse primers designed for amplification of ESAT-6 gene of *Mycobacterium tuberculosis* show non-specific amplification, with the homology search revealing binding of the forward and reverse primers at multiple locations in the genome. Design a strategy for specific amplification of the gene. [4]

Q3. Write short notes on the method and applications of the following in diagnostics: [3 X 2 = 6]

- i. RAPD
- ii. SSR

Q4. With reference to Biosensors answer the following: [3 X 2 = 6]

- a. What are the basic steps in designing of a biosensor?
- b. Utility of Telemedicine in health care for a difficult geographical area like Himachal Pradesh.

Q5. HBB gene of human may contain an SNP, which lead to Sickle cell disease (SCD) instead of normal hemoglobin. Suggest and elaborate all possible methods which may be used to analyze SNP in human DNA. [5]